

**CLAIMS**

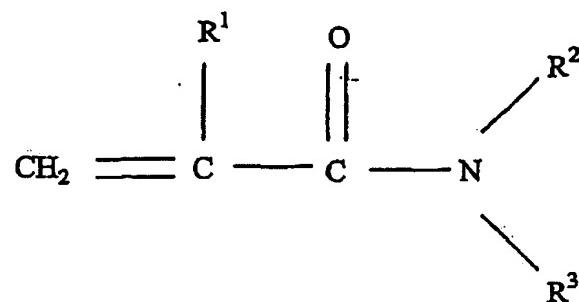
1. A process for the production of anionic water-in-water polymeric dispersions comprising at least one finely dispersed, water-soluble and/or water-swellable polymer A and a continuous aqueous phase, which phase contains an aliquot of at least one polymeric dispersing agent B in which monomers that are distributed in this aqueous phase are subjected to free-radical polymerization and, on completion of said polymerization, the reaction mixture is subsequently diluted with the residual amount of said dispersing agent B.
2. A process as defined in claim 2, characterized in that said polymeric dispersing agent B comprises at least one functional group selected from the group consisting of ether groups, carboxyl groups, sulfone groups, sulfate ester groups, amino groups, amido groups, imido groups, tert-amino groups, and/or quaternary ammonium groups.
3. A process as defined in claim 3, characterized in that said polymeric dispersing agent B is a cellulose derivative, polyvinyl acetate, starch, a starch derivative, dextran, polyvinylpyrrolidone, polyvinylpyridine, polyethylene imine, polyamine, polyvinylimidazole, polyvinylsuccinimide, polyvinyl-2-methylsuccinimide, polyvinyl-1,3-oxazolid-2-one, polyvinyl-2-methylimidazoline, and/or the respective copolymers thereof with maleic acid, maleic anhydride, fumaric acid, itaconic acid, itaconic anhydride, (meth)acrylic acid, salts and/or esters of (meth)acrylic acid and/or a (meth)acrylamide compound.
4. A process as defined in any one of claims 1 to 3, characterized in that said dispersing agent B is an anionic polymer composed of at least 30 % by weight of anionic monomers.
5. A process as defined in any one of claims 1 to 4, characterized in that said dispersing agent B has an average molecular weight  $M_w$  of not more than 250,000 g/mol.
6. A process as defined in any one of claims 1 to 5, characterized in that the

aliquot of said dispersing agent B in the aqueous phase is equal to from 60 to 95 % by weight of the total weight of said dispersing agent B.

7. A process as defined in any one of claims 1 to 6, characterized in that at least one water-soluble polymeric dispersing agent B is used together with at least one water-soluble polyfunctional alcohol and/or its reaction product with fatty amines.
8. A process as defined in claim 7, characterized in that the water-soluble polyfunctional alcohols used are polyalkylene glycols, block copolymers of propylene/ethylene oxide having molecular weights of from 50 to 50 000, low-molecular weight polyfunctional alcohols and/or their reaction products with fatty amines containing from 6 to 22 carbons in the alkyl or alkylene radical.
9. A process as defined in any one of claims 7 to 8, characterized in that said polymeric dispersing agent B is used together with at least one polyfunctional alcohol in amounts of from 5 to 50 % by weight, based on the total dispersion.
10. A process as defined in any one of claims 7 to 9, characterized in that said the ratio, by weight, of said polymeric dispersing agent B to said polyfunctional alcohol is in the range of from 1.00 : 0.01 to 1.00 : 0.5.
10. A process as defined in any one of claims 1 to 9, characterized in that polymer A is composed of anionic, non-ionic, amphiphilic, and/or cationic monomers.
11. A process as defined in any one of claims 1 to 10, characterized in that the anionic monomers used are
  - a.) olefinically unsaturated carboxylic acids, carboxylic anhydrides, and water-soluble alkali metal salts, alkaline earth metal salts, and ammonium salts thereof,
  - b.) olefinically unsaturated sulfonic acids and/or said water-soluble alkali metal salts, alkaline earth metal salts, and ammonium salts thereof,
  - c.) olefinically unsaturated phosphonic acids and/or said water-soluble alkali metal salts, alkaline earth metal salts, and ammonium salts thereof, and

d.) sulfomethylated and/or phosphonomethylated acrylamides and/or said water-soluble alkali metal salts, alkaline earth metal salts, and ammonium salts thereof.

12. A process as defined in any one of claims 1 to 11, characterized in that the non-ionic monomers used are monomers of the general formula (I)



(I)

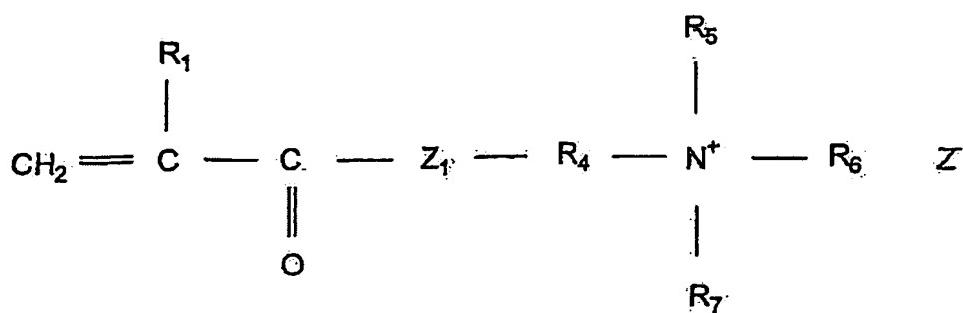
in which

$\text{R}^1$  stands for a hydrogen radical or a methyl radical, and

$\text{R}^2$  and  $\text{R}^3$  independently stand for hydrogen, or an alkyl or hydroxyalkyl radical containing from 1 to 5 carbon atoms, and

$\text{R}^2$  or  $\text{R}^3$  stands for an OH group,

13. A process as defined in any one of claims 1 to 12, characterized in that the amphiphilic monomers used are monomers of the general formula (II)



wherein  $Z_1$  stands for O, NH, NR<sub>4</sub> wherein R<sub>4</sub> denotes alkyl containing from 1 to 4 carbons,

R<sub>1</sub> stands for hydrogen or a methyl radical,

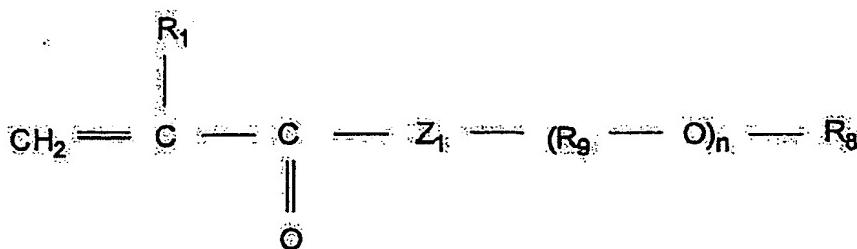
R<sub>4</sub> stands for alkene containing from 1 to 6 carbons,

R<sub>5</sub> and R<sub>6</sub> independently stand for an alkyl group containing from 1 to 6 carbons,

R<sub>7</sub> stands for an alkyl radical, an aryl radical, and/or an aralkyl radical containing from 8 to 32 carbons and

Z<sup>-</sup> stands for halogen, pseudo-halogen, SO<sub>4</sub>CH<sub>3</sub><sup>-</sup> or acetate,

or monomers of the general formula (III)



wherein

$Z_1$  stands for O, NH, or NR<sub>4</sub>, wherein R<sub>4</sub> denotes alkyl containing from 1 to 4 carbons,

R<sub>1</sub> stands for hydrogen or a methyl radical,

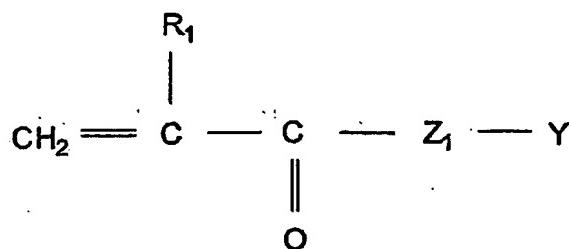
R<sub>3</sub> stands for hydrogen, an alkyl radical, an aryl radical, and/or an aralkyl radical containing from 8 to 32 carbons,

R<sub>9</sub> stands for an alkylene radical containing from 2 to 6 carbons,

and

n stands for an integer from 1 to 50.

14. A process as defined in any one of claims 1 to 13, characterized in that the cationic monomers used are compounds of the general formula (IV)

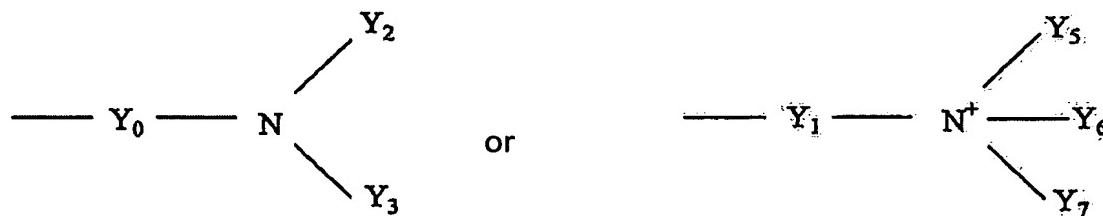


wherein

$R_1$  stands for hydrogen or a methyl radical,

$Z_1$  stands for O, NH or  $\text{NR}_4$  where  $R_4$  stands for an alkyl radical containing from 1 to 4 carbon atoms,

$Y$  stands for one of the groups



wherein

$Y_0$  and  $Y_1$  stand for an alkylene radical or hydroxyalkylene radical containing from 2 to 6 carbon atoms,

$Y_2$ ,  $Y_3$ ,  $Y_4$ ,  $Y_5$ ,  $Y_6$ ,  $Y_7$ , independently stand for an alkyl radical containing from 1 to 6 carbon atoms, and

$Z^-$  stands for halogen, acetate, or  $\text{SO}_4\text{CH}_3^-$ .

15. A process as defined in any one of claims 1 to 14, characterized in that the monomeric composition to be used for the production of said polymer A

consists of anionic monomers, to an extent of from 0 to 100 % by weight, based on the total weight of monomers.

16. A process as defined in any one of claims 1 to 15, characterized in that polymer A has a  $M_w$  of  $>1,0 \times 10^6$  g/mol.
17. A process as defined in any one of claims 1 to 16, characterized in that polymerization is carried out in the presence of a salt in an amount of not more than 3.0 % by weight, based on the total dispersion .
18. A process as defined in any one of claims 1 to 17, characterized in that the reaction mixture is cooled following polymerization and is subsequently diluted with the residual amount of said dispersing agent B.
19. A process as defined in any one of claims 1 to 18, characterized in that the reaction mixture is cooled to  $\leq 35$  °C.
20. A process as defined in any one of claims 1 to 16, characterized in that the reaction mixture is subsequently diluted with from 5 to 50 % of said dispersing agent B by weight, based on the total weight thereof.
21. A water-in-water polymer dispersion whenever obtained as defined in one or more of claims 1 to 20.
22. The use of the water-in-water polymer dispersion as defined in claim 21 for solid/liquid separation in aqueous systems.
23. The use of the water-in-water polymeric dispersions as defined in claim 21 as an auxiliary in papermaking.
24. The use of the water-in-water polymer dispersion as defined in claim 21 in retention agent systems in papermaking.